A1 Concluded

which can be as large as a factor of 1,000, occurs when light incident on the conductive film interacts resonantly with a surface plasmon mode.

Please replace the paragraph at page 8, line 22 to page 9, line 14 with the following:

A2

The metal film 22 is also provided with a periodic surface topography 40 on at least one of the two surfaces of the metal film 22 (the two surfaces being a first surface adjacent to the end face 12 of waveguide 10, and a second surface opposite the first surface which faces the optical storage medium 50). The periodic surface topography 40 may be provided on either or both of the two surfaces of the metal film 22, although it is believed to be preferable for the surface features 40 to be provided only on the first surface of the metal film 22 adjacent to the end face 12 of waveguide 10. The periodic surface topography 40 includes raised and/or depressed regions (as opposed to a substantially smooth surface) known as surface features, wherein such surface features are arranged with a periodicity or in a regularly repeated pattern. The periodicity of the surface features is important for determining the wavelength of the enhanced light collection, and is described in further detail in U.S. Patent No. 6,236,033 to Ebbesen et al. *See also* Grupp et al., *supra*. Examples of a periodic surface topography 40 are a square array of dimples or semi-spherical protrusions as shown in FIG. 1B, or a set of concentric raised or depressed rings as shown in FIG. 1C, of which the lattice constant (FIG. 1B) or the radii (FIG. 1C) are tuned to the wavelength of the read/write laser used in conjunction with the read/write head 100. *See* U.S. Patent No. 6,236,033 to Ebbesen et al.; Grupp et al., *supra*; H.F. Ghaemi et al., "Surface Plasmons Enhance Optical Transmission Through Subwavelength Holes," *Physical Review B,* Vol. 58, No. 11, pp. 6779-6782 (1998). The above exemplary periodic surface topographies are merely examples and do not limit the invention. Rather, other arrangements of periodic surface topography 40 are also possible and are encompassed by the invention. With this arrangement, light incident on one of the surfaces of the metal film interacts with

A2 Concluded

, a surface plasmon mode on at least one of the surfaces of the metal film thereby enhancing transmission of light through the aperture in the metal film.

Please replace the paragraph at page 9, line 28 to page 10, line 16 with the following:

A3

As shown in FIG. 1A, an overlayer 24 is also preferably provided on the second surface of the metal film 22 of the PED 20 (that is, the surface of metal film 22 facing the optical storage medium 50), although such an overlayer 24 is not required. The overlayer 24 comprises an optically transparent dielectric material. Overlayer 24 may protect the read/write head 100, and in particular the PED 20, from damage caused by striking the surface of optical storage medium 50 or otherwise. Moreover, overlayer 24 may provide further enhanced optical transmission through PED 20. Specifically, by selecting a material for overlayer 24 which has a refractive index which is substantially equal to that of waveguide 10, the total transmission through the PED is further enhanced. For example, if the waveguide 10 is an amorphous silica optical fiber, the overlayer 24 could also be made of amorphous silica so as to have a refractive index which is substantially equal to that of the waveguide. Experimentally, this further enhancement with a refractive index-matching overlayer 24 has been demonstrated to boost the optical transmission through the PED 20 by an additional factor of 10. This effect is described in further detail in U.S. Patent No. 6,285,020 to Kim et al. *See also* A. Krishnan et al., "Enhanced Light Transmission by Resonance Tunneling Through Subwavelength Holes," NEC Research Institute, Inc. Technical Report No. 99-152 (1999). Further, the material comprising overlayer 24 is preferably mechanically hard and is preferably suited to absorb without failure the temperature rise which usually accompanies an unintended "crash" (i.e. mechanical contact) of the read/write head with the optical storage medium.

Please replace the paragraph at page 13, lines 5-29 with the following:

A4

In a read/write head linear array configuration as shown in FIGS. 3A and 3B, if the center-to-center distance between PED's is ΔR=1.6μm (which reflects

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the track pitch for current optical storage media such as CD-ROM or DVD), there will be no crosstalk between neighboring read/write heads. In a sample in which the position of the PED apertures with respect to the surface features is varied across the sample, the light transmitted through the sample is varied accordingly on a length scale of 2μm, evincing the highly local nature of the transmission enhancement. *See* U.S. Patent No. 6,236,033 to Ebbesen et al. Moreover, it has been shown that only one or two "shells" of nearest-neighbor surface features (e.g. dimples) is sufficient to obtain the full transmission enhancement. *See* Thio et al., *supra*. The term "shell" is well-known in the art of solid-state physics. Each shell comprises a group of surface features positioned at the same distance from the aperture. For example, for a square array, the first shell comprises the nearest surface feature neighbors (in this case, four surface features forming the corners of a square). The second shell comprises the next-nearest surface feature neighbors (in this case, the four surface features on the diagonal), and so forth. For example, if a red laser is used (λ=635nm) with circular apertures and dimples as surface features provided on the surface of the metal film adjacent to the waveguide, the distance between an aperture and the neighboring surface feature (a dimple in this case) in each PED should be about ($600/n$) nm, where n is the refractive index of the dielectric material adjacent to the surface features on metal film 22 (for example, the overlayer 24 if the surface features are on that side of the metal film 22). This can be accommodated in the 0.8μm distance to the midpoint between two immediately neighboring circular apertures. Taking the index of refraction of the waveguide into account, the dimple period should be 0.2μm, so that several shells of surface feature neighbors can be accommodated around each aperture. In order to further decrease crosstalk, apertures can be alternately optimized for different wavelengths, for instance 635nm and 830nm, as described in U.S. Patent No. 6,236,033 to Ebbesen et al.